Listing of Claims

Claims 1 - 17; 19 - 21 (cancelled)

Claim 18 (original) A method for applying wear reducing material . . .

Claims 22 (new) A method for applying wear reducing material . . .

Claim 23 (new) The method of claim 22 . . .

Claims 24 (new) The method of claim 22 . . .

Claim 25 (new) The method of claim 22 . . .

Claim 26 (new) The method of claim 22 . . .

Claim 27 (new) The method of claim 26 . . .

Claims 28 - 30 (new) The method of claim 22 . . .

Claim 31 (new) The method of claim 30 . . .

Claim 32 (new) The method of claim 22 . . .

Claim 33 (new) The method of claim 22 . . .

Claim 34 (new) The method of claim 24 . . .

Claim 35 (new) The method of claim 22 . . .

Claim 36 (new) The method of claim 22 . . .

Claim 37 (new) The method of claim 22 . . .

Claim 38 (new) A method for applying wear reducing material . . .

Claim 39 (new) A method for applying wear reducing material . . .

Claim 40 (new) The method of claim 39 . . .

Claim 41 (new) A method for applying wear reducing material . . .

Claim 42 (new) A method for applying wear reducing material . . .

Pending Claims

18. (original) A method for applying wear reducing material to a tool joint useful in a wellbore in drilling operations, the method comprising

positioning the tool joint adjacent laser beam apparatus,

delivering wear-reducing material to a location on the tool joint to which the wear-reducing material is to be applied, the wear-reducing material having a melting temperature,

heating the wear-reducing material with the laser beam apparatus to a temperature not exceeding the melting temperature of the wear-reducing material thereby welding the wear-reducing material to the tool joint,

wherein the laser beam apparatus is defocused so that no plasma is formed adjacent the tool joint,

wherein the wear-reducing material is applied with a substantially uniform thickness to the tool joint,

wherein a metallurgical bond is formed between the wear-reducing material and the tool joint,

wherein the wear-reducing material includes carbides,

wherein the carbides are in a matrix of wear resistant material, and

wherein the tool joint is made of base metal and there is less than 5% dilution of the base metal by the applied wear-reducing material.

22. (new) A method for applying wear reducing material to a tool joint useful in a wellbore in drilling operations, the method comprising

positioning the tool joint adjacent laser beam apparatus,

delivering wear-reducing material to a location on the tool joint to which the wear-reducing material is to be applied, the wear-reducing material having a melting temperature,

heating the wear-reducing material with the laser beam apparatus to a temperature not exceeding the melting temperature of the wear-reducing material thereby welding the wear-reducing material to the tool joint, and

wherein the tool joint is made of base metal and there is less than 5% dilution of the base metal by the applied wear-reducing material.

23. (new) The method of claim 22 wherein the tool joint is made of base metal and there is less than 2% dilution of the base metal by the applied wear-reducing material.

24. (new) The method of claim 22 wherein the wear-reducing material is heated with a laser beam that is defocused so that the melting temperature of the wear-reducing material is not exceeded.

25. (new) The method of claim 22 wherein the tool joint is made of tool joint material and the wear-reducing material is heated with a laser beam that is defocused so that the tool joint material is not melted.

26. (new) The method of claim 22 wherein the wear-reducing material is applied in a pattern of intermittent spaced-apart areas of wear-reducing material.

27. (new) The method of claim 26 wherein the intermittent spaced-apart areas of wear reducing material provide fluid flow paths therebetween for enhancing fluid flow past the tool joint when it is within a wellbore.

28. (new) The method of claim 22 further comprising

applying the wear-reducing material to the tool joint so that cracks are formed in the wear-reducing material for reducing stress in the applied wear-reducing material.

29. (new) The method of claim 22 wherein the laser beam apparatus is defocused so that no plasma is formed adjacent the tool joint.

30. (new) The method of claim 22 wherein the wear-reducing material is applied with a substantially uniform thickness to the tool joint.

31. (new) The method of claim 30 wherein the thickness varies between ± 0.020 inches.

32. (new) The method of claim 22 wherein a metallurgical bond is formed between the wear-reducing material and the tool joint.

33. (new) The method of claim 22 wherein the wear-reducing material includes carbides.

34. (new) The method of claim 24 wherein the carbides are in a matrix of wear resistant material

35. (new) The method of claim 22 wherein the wear-reducing material is

combined with friction reducing material.

36. (new) The method of claim 22 wherein the wear-reducing material is from the group consisting of carbides, borides, silicides, and nitrides.

37. (new) The method of claim 22 wherein the wear-reducing material is alloyed with an alloying element from the group consisting of chromium, manganese, molybdenum, vanadium, boron, carbon, aluminum, titanium, zirconium, tantalum, sulfur, silicon, phosphorus, bismuth, cerium, praseodymium, neodymium, promethium, samarium, europium, gadolinium, terbium, dysprosium, holmium, erbium, thulium, ytterbium, and lutetium.

38. (new) A method for applying wear reducing material to a tool joint useful in a wellbore in drilling operations, the tool joint made of base metal, the method comprising

positioning the tool joint adjacent laser beam apparatus,

delivering wear-reducing material to a location on the tool joint to which the wear-reducing material is to be applied,

heating the wear-reducing material with a defocused laser beam of the laser beam apparatus thereby welding the wear-reducing material to the tool joint, and

wherein there is less than 2% dilution of the tool joint's base metal by the applied wear reducing material.

39. (new) A method for applying wear reducing material to a tool joint useful in a wellbore in drilling operations, the method comprising

positioning the tool joint adjacent laser beam apparatus,

delivering wear-reducing material to a location on the tool joint to which the wear-reducing material is to be applied, the wear-reducing material having a melting temperature,

heating the wear-reducing material with the laser beam apparatus to a temperature not exceeding the melting temperature of the wear-reducing material thereby welding the wear-reducing material to the tool joint, and

wherein the wear-reducing material is applied in a pattern of intermittent spaced-apart areas of wear-reducing material.

40. (new) The method of claim 39 wherein the intermittent spaced-apart areas of wear reducing material provide fluid flow paths therebetween for enhancing fluid flow past the tool joint when it is within a wellbore.

41. (new) A method for applying wear reducing material to a tool joint useful in a wellbore in drilling operations, the method comprising

positioning the tool joint adjacent laser beam apparatus,

delivering wear-reducing material to a location on the tool joint to which the wear-reducing material is to be applied, the wear-reducing material having a melting temperature,

heating the wear-reducing material with the laser beam apparatus to a temperature not exceeding the melting temperature of the wear-reducing material thereby welding the wear-reducing material to the tool joint, and

applying the wear-reducing material to the tool joint so that cracks are formed in the wear-reducing material for reducing stress in the applied wear-reducing material.

42. (new) A method for applying wear reducing material to a tool joint useful in a wellbore in drilling operations, the method comprising

positioning the tool joint adjacent laser beam apparatus,

delivering wear-reducing material to a location on the tool joint to which the wear-reducing material is to be applied, the wear-reducing material having a melting temperature,

heating the wear-reducing material with the laser beam apparatus to a temperature not exceeding the melting temperature of the wear-reducing material thereby welding the wear-reducing material to the tool joint, and

wherein the wear-reducing material is applied with a substantially uniform thickness to the tool joint and said substantially uniform thickness varies between ± 0.020 inches.